FIG. 1

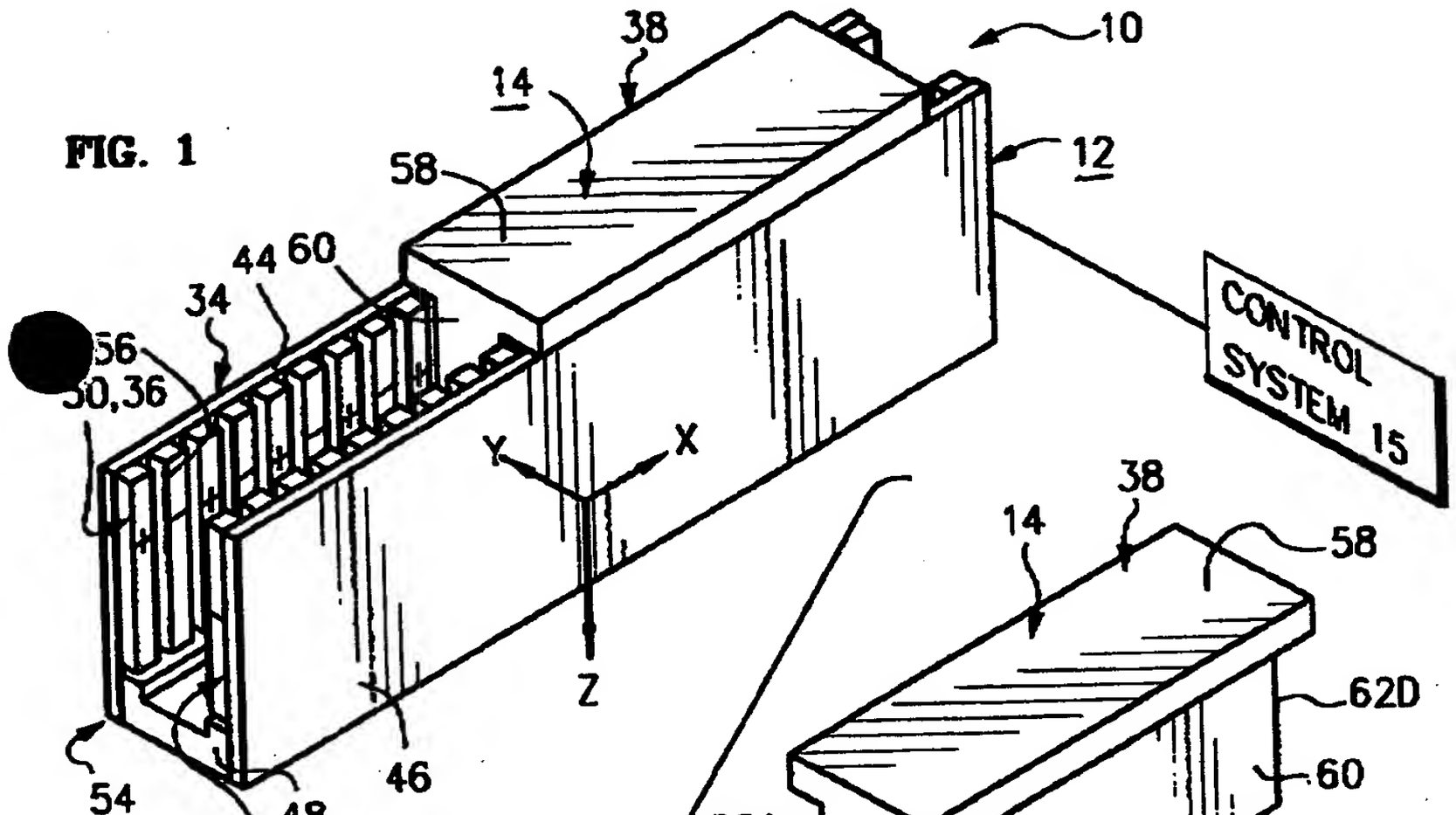


FIG. 2

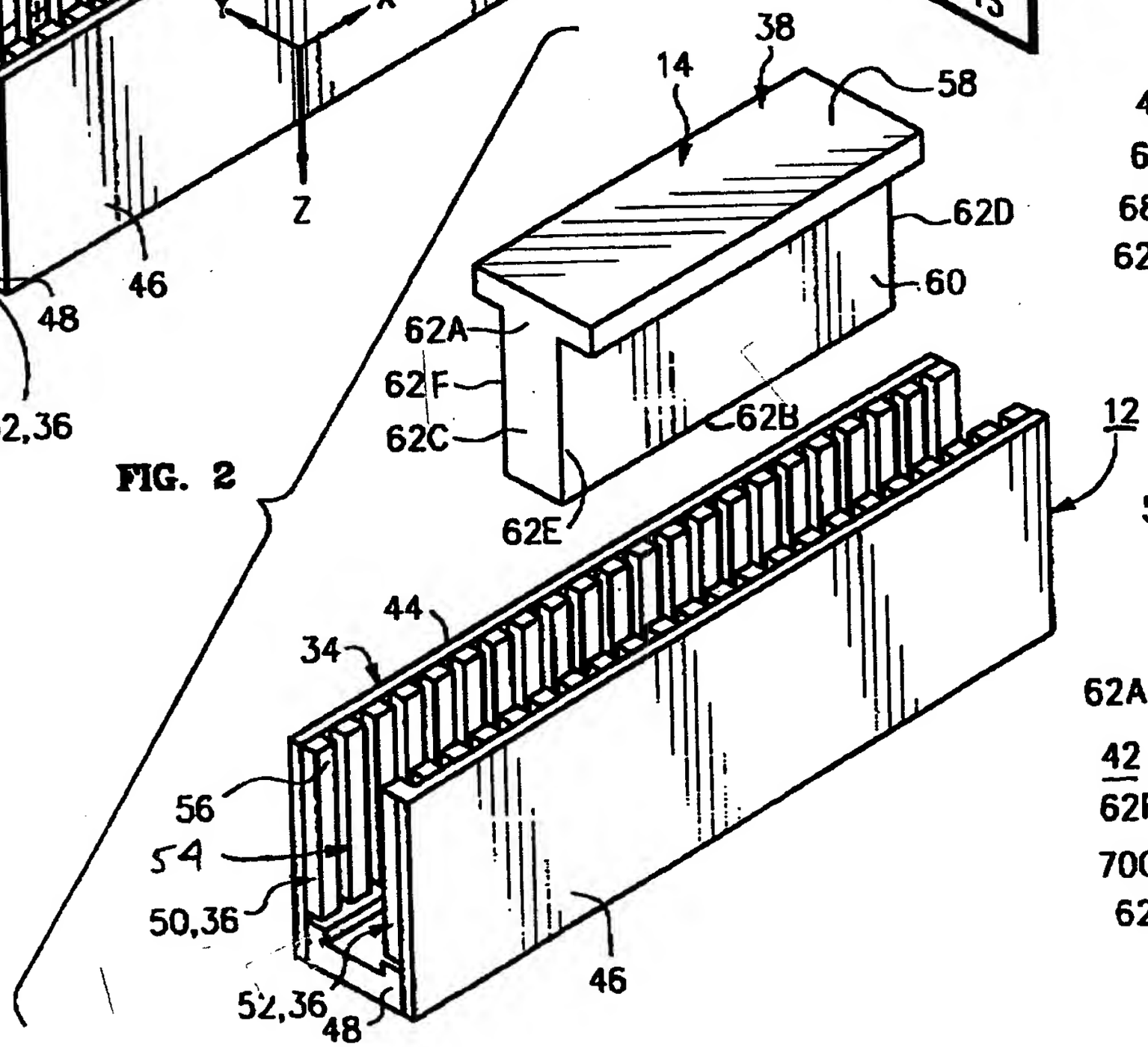


FIG. 3A

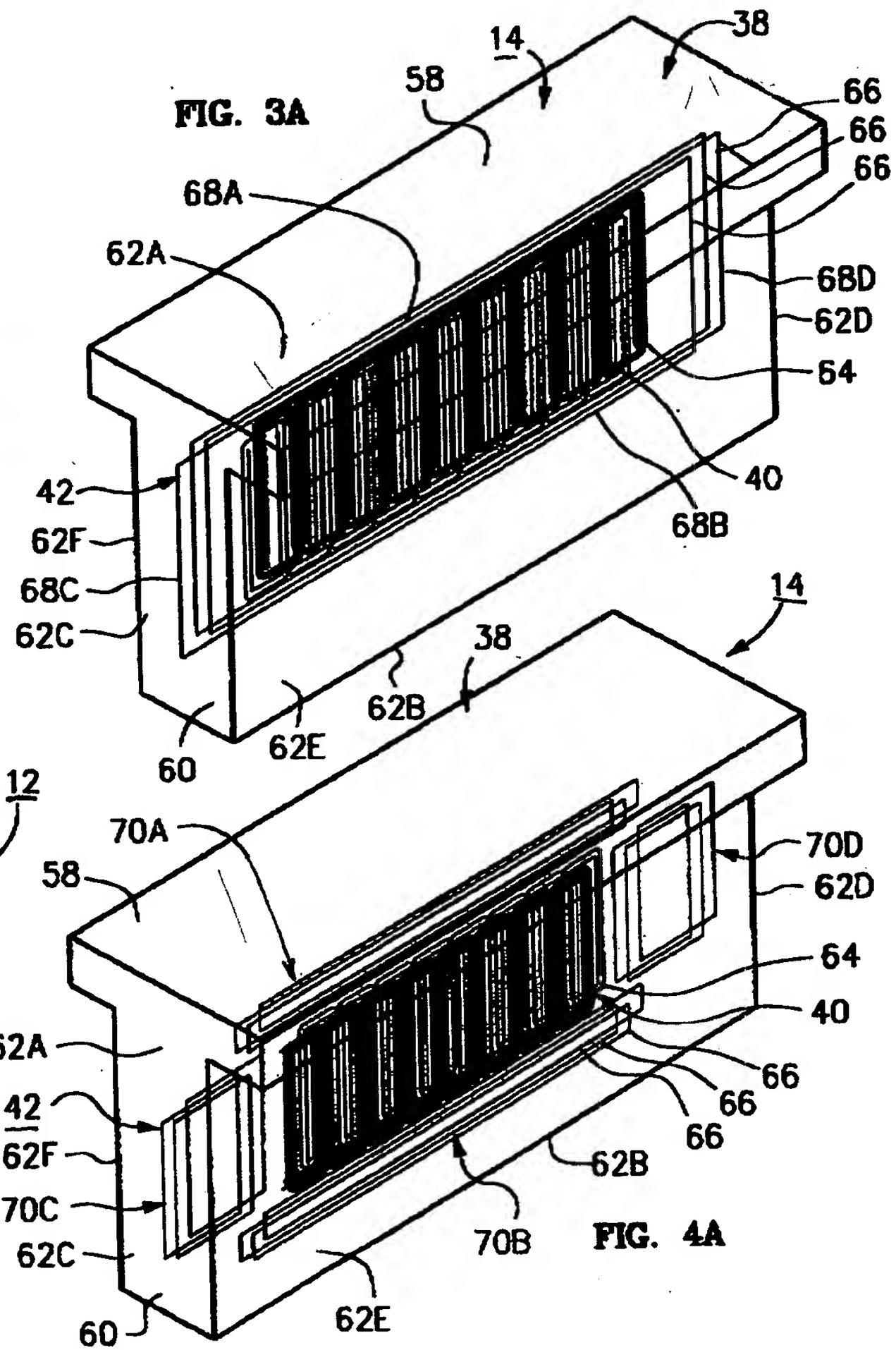
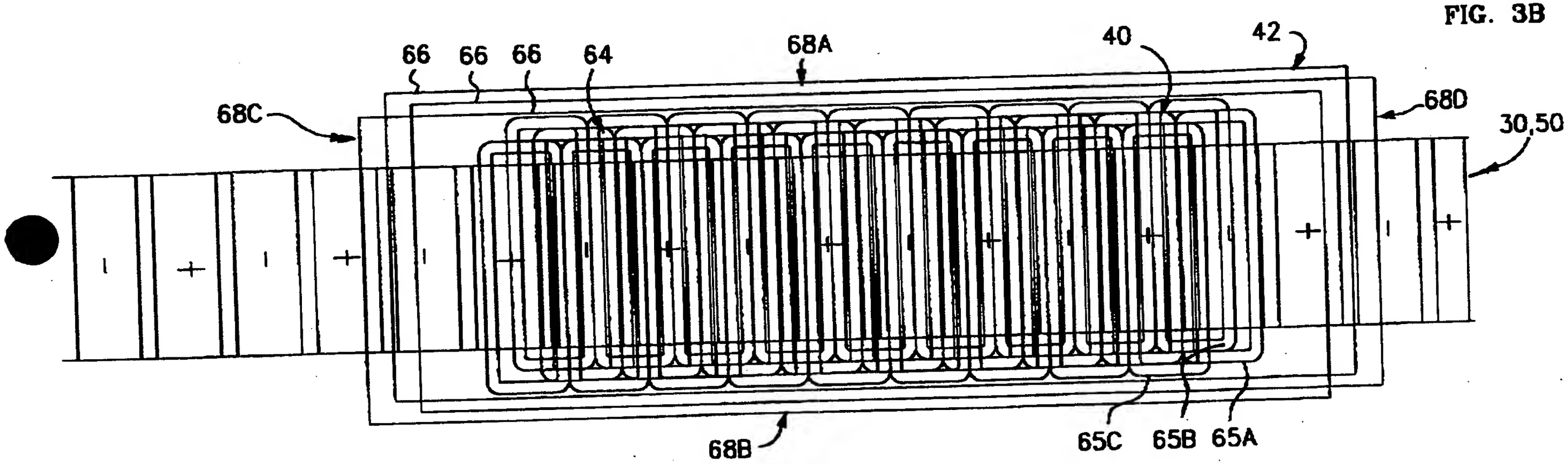


FIG. 4A

FIG. 3B



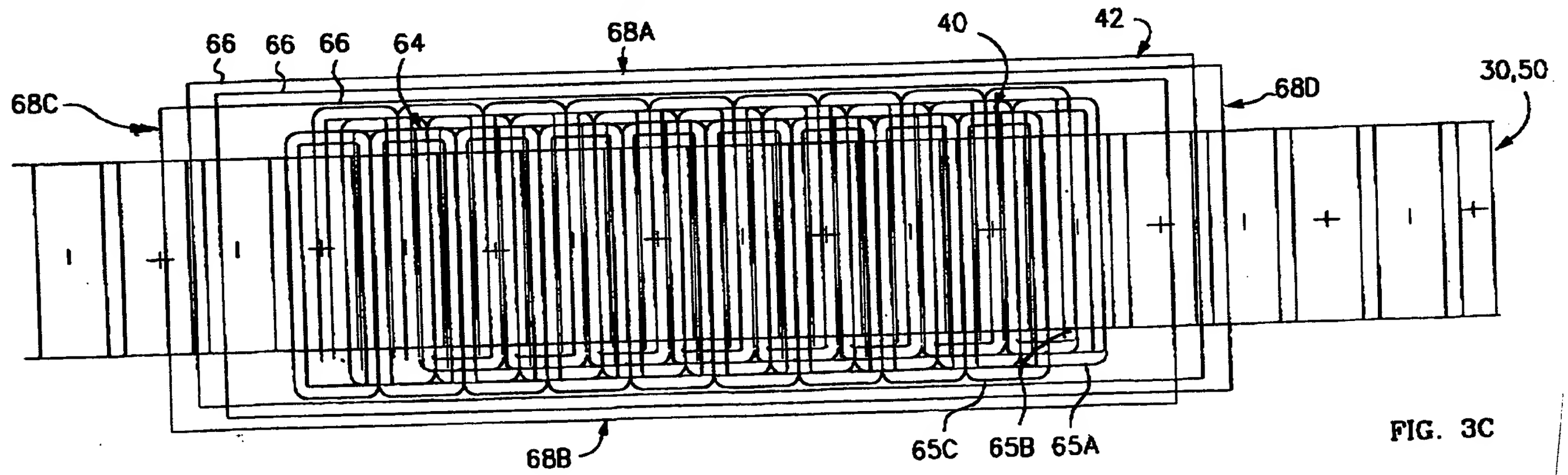


FIG. 3C

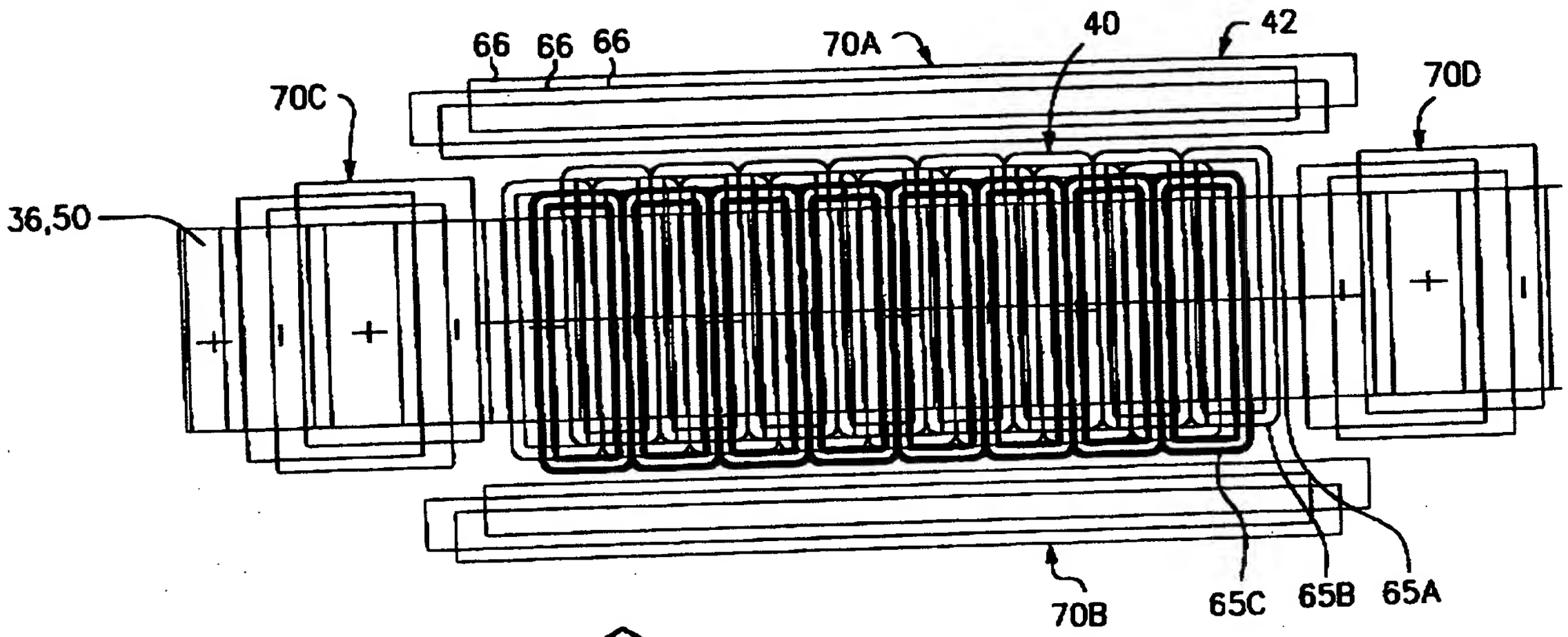


FIG. 4B

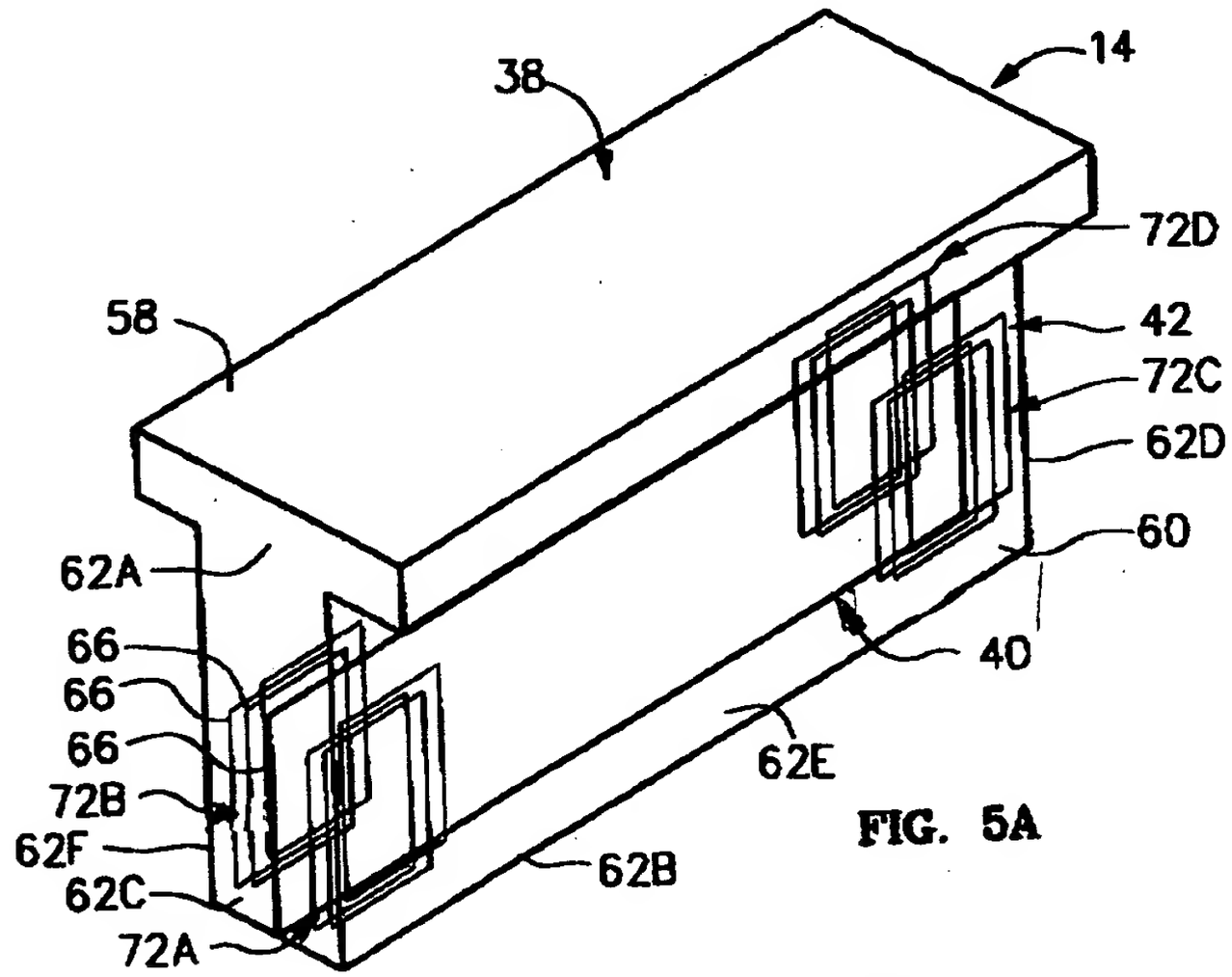


FIG. 5A

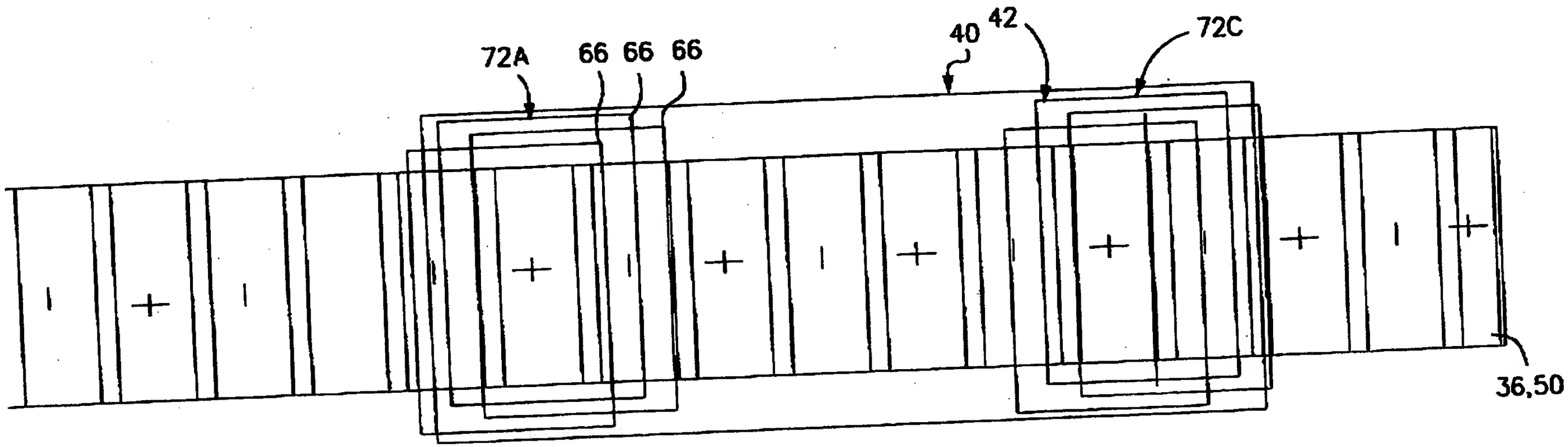


FIG. 5B

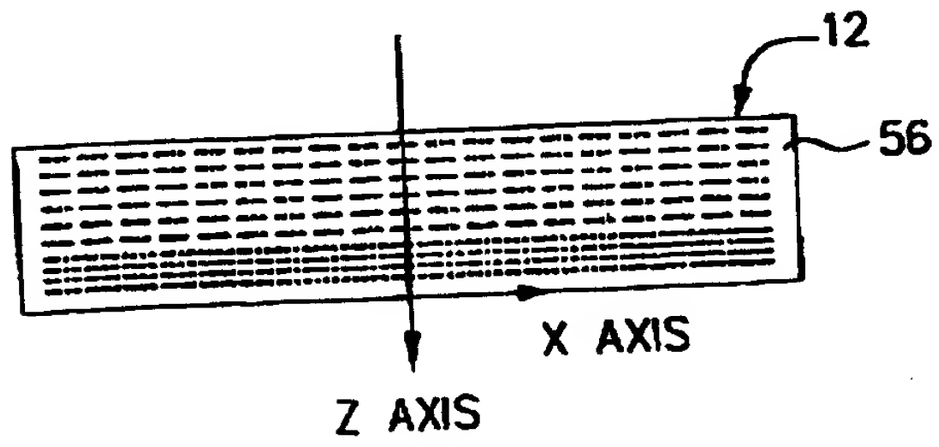


FIG. 6A

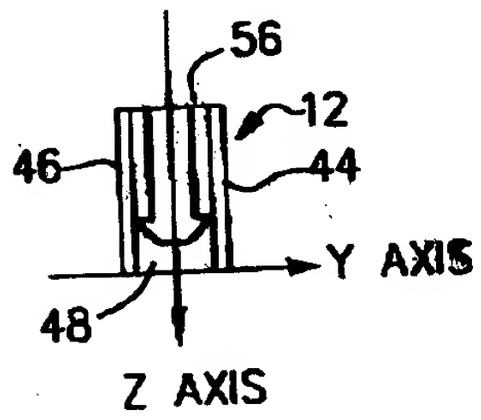


FIG. 6B

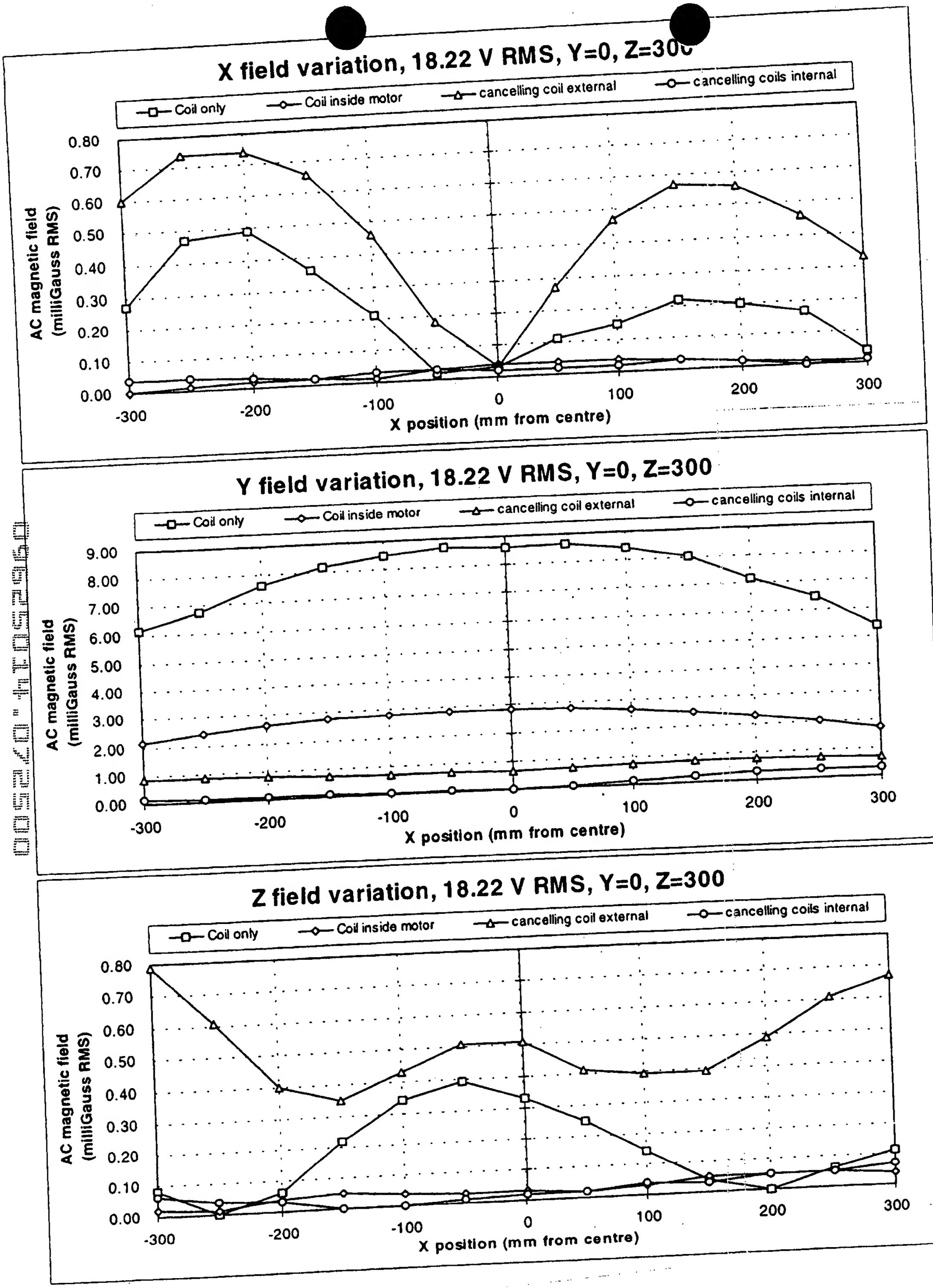

X field variation, 18.22 V RMS, Y=0, Z=300
Coil only
Coil inside motor
cancelling coil external
cancelling coils internal
AC magnetic field (milliGauss RMS)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-300
-200
-100
0
100
200
300
X position (mm from centre)
Y field variation, 18.22 V RMS, Y=0, Z=300
Coil only
Coil inside motor
cancelling coil external
cancelling coils internal
AC magnetic field (milliGauss RMS)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-300
-200
-100
0
100
200
300
X position (mm from centre)
Z field variation, 18.22 V RMS, Y=0, Z=300
Coil only
Coil inside motor
cancelling coil external
cancelling coils internal
AC magnetic field (milliGauss RMS)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-300
-200
-100
0
100
200
300
X position (mm from centre)

Fig 7

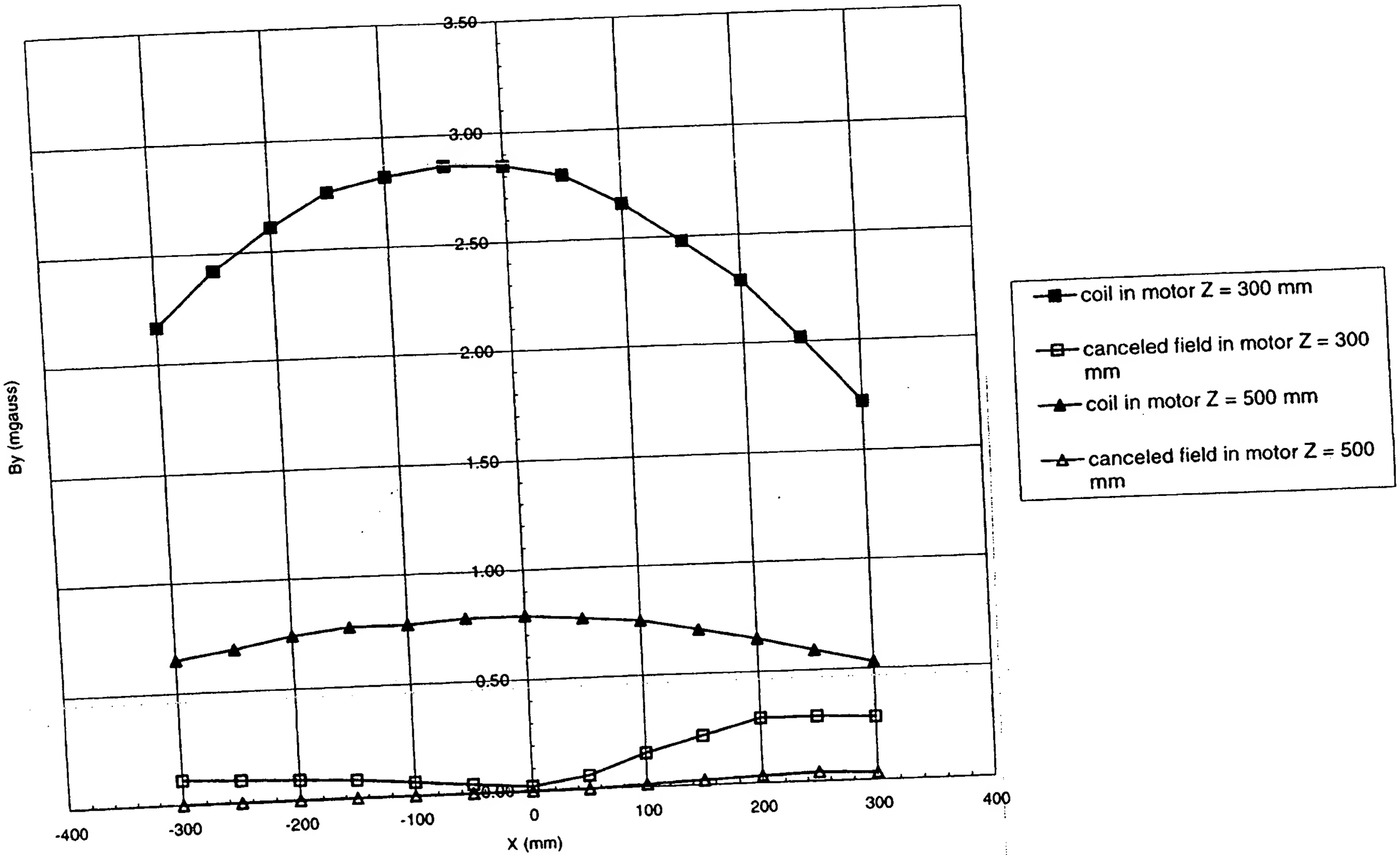


Fig. 8

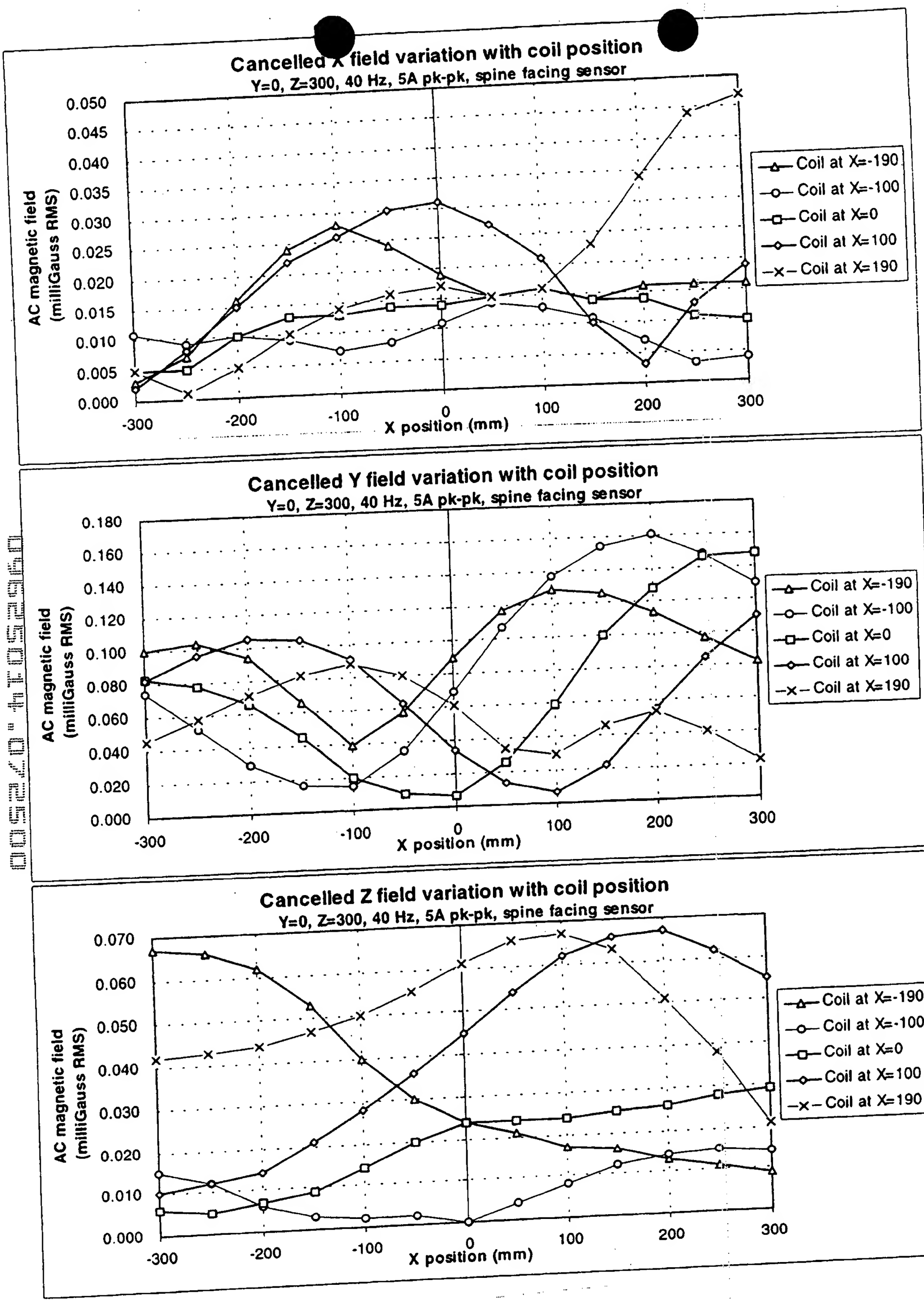
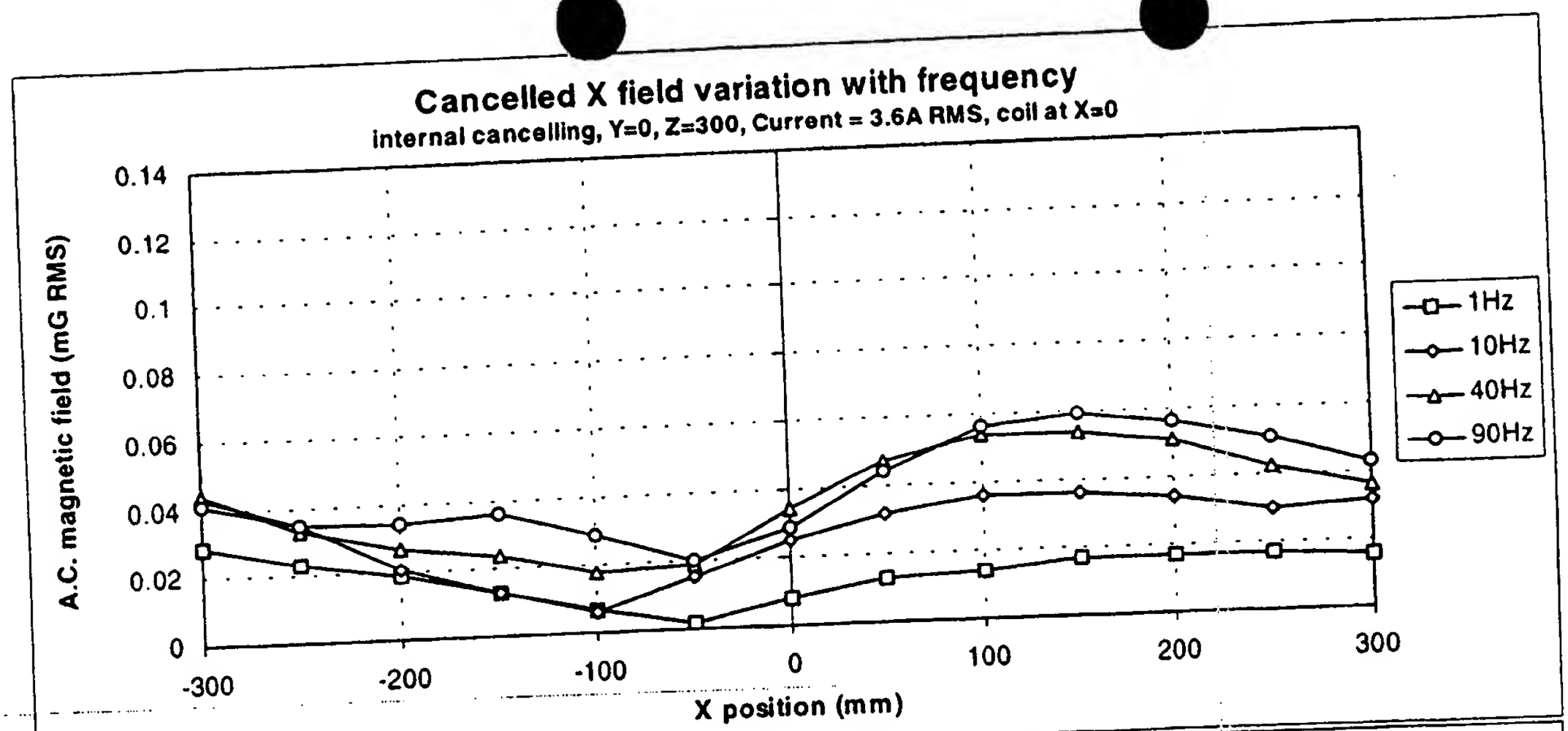
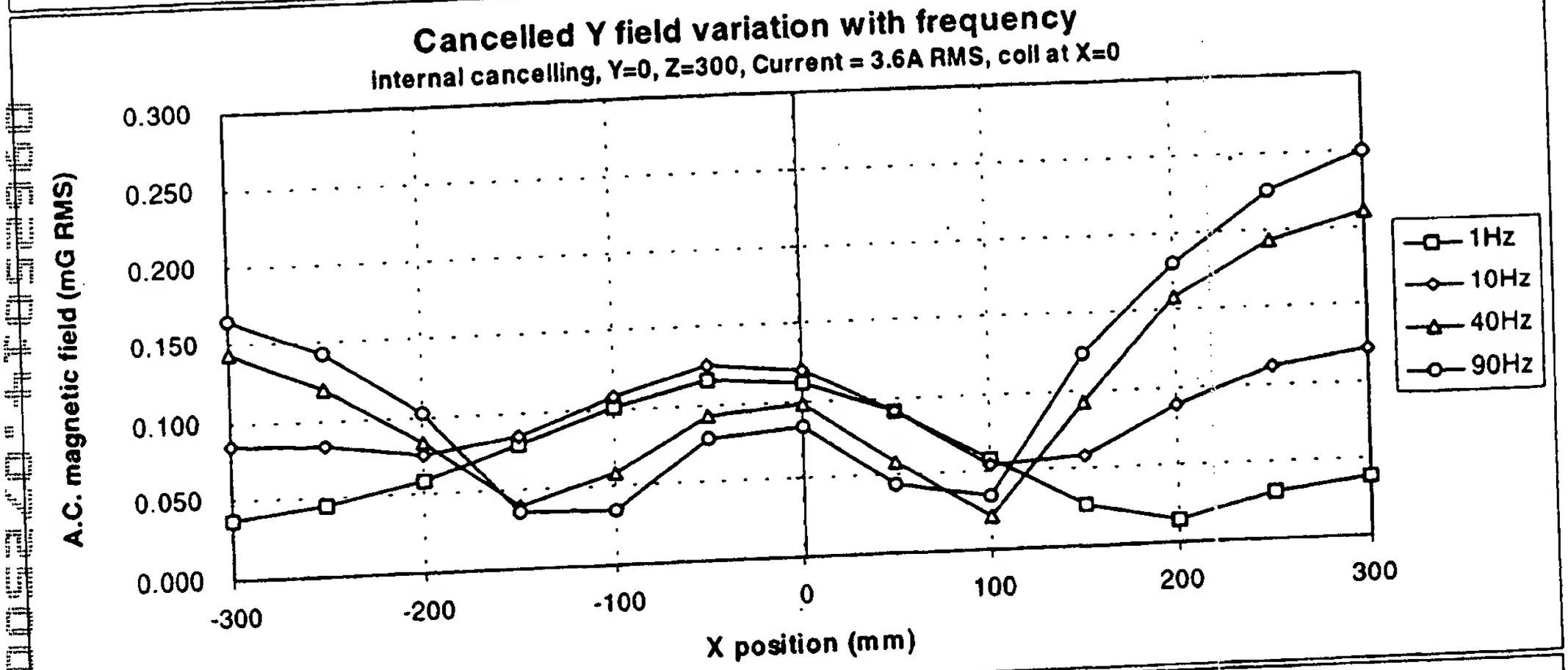

Cancelled X field variation with coil position
Y=0, Z=300, 40 Hz, 5A pk-pk, spine facing sensor
AC magnetic field (milliGauss RMS)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
-300
-200
-100
0
100
200
300
X position (mm)
Coil at X=-190
Coil at X=-100
Coil at X=0
Coil at X=100
Coil at X=190
Cancelled Y field variation with coil position
Y=0, Z=300, 40 Hz, 5A pk-pk, spine facing sensor
AC magnetic field (milliGauss RMS)
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
-300
-200
-100
0
100
200
300
X position (mm)
Coil at X=-190
Coil at X=-100
Coil at X=0
Coil at X=100
Coil at X=190
Cancelled Z field variation with coil position
Y=0, Z=300, 40 Hz, 5A pk-pk, spine facing sensor
AC magnetic field (milliGauss RMS)
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
-300
-200
-100
0
100
200
300
X position (mm)
Coil at X=-190
Coil at X=-100
Coil at X=0
Coil at X=100
Coil at X=190

Fig. 9


Cancelled X field variation with frequency
internal cancelling, Y=0, Z=300, Current = 3.6A RMS, coil at X=0
A.C. magnetic field (mG RMS)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-300
-200
-100
0
100
200
300
X position (mm)
1Hz
10Hz
40Hz
90Hz


Cancelled Y field variation with frequency
internal cancelling, Y=0, Z=300, Current = 3.6A RMS, coil at X=0
A.C. magnetic field (mG RMS)
0.300
0.250
0.200
0.150
0.100
0.050
0.000
-300
-200
-100
0
100
200
300
X position (mm)
1Hz
10Hz
40Hz
90Hz

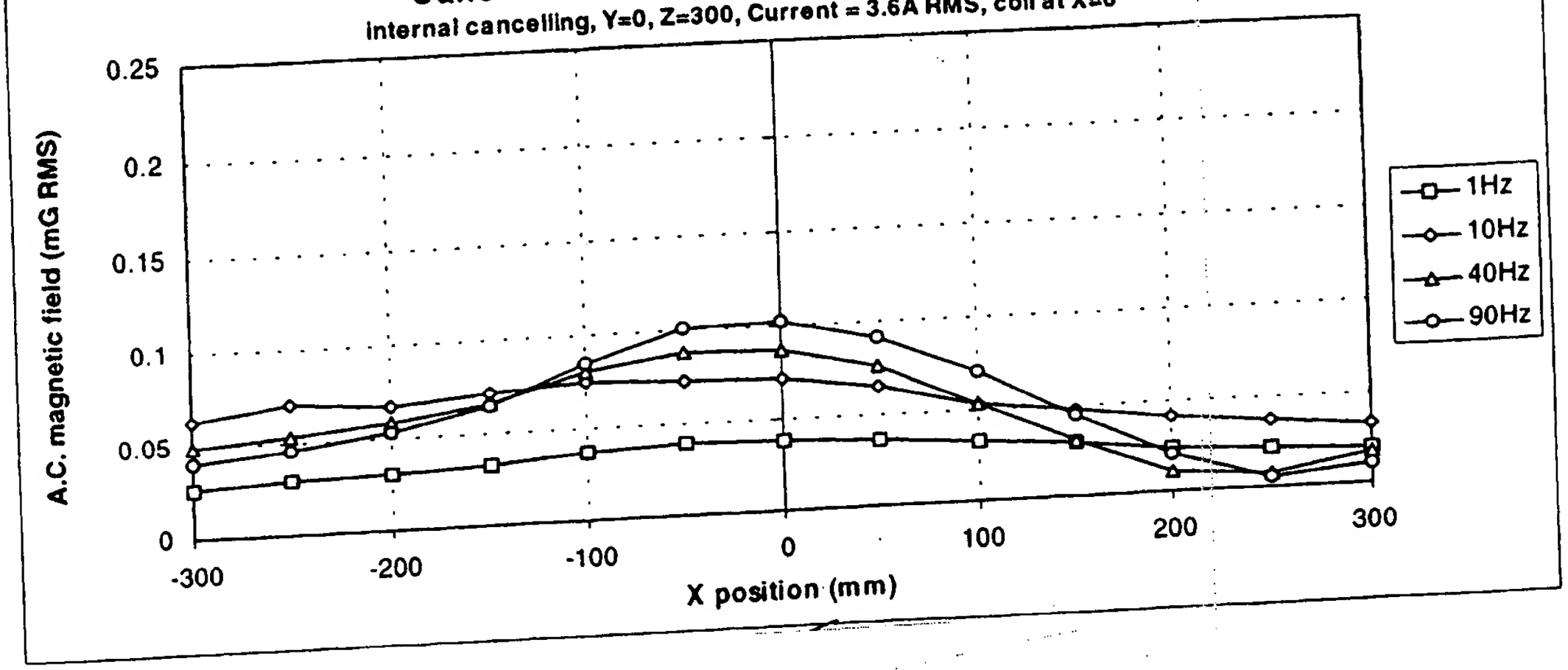

Cancelled Z field variation with frequency
internal cancelling, Y=0, Z=300, Current = 3.6A RMS, coil at X=0
A.C. magnetic field (mG RMS)
0.25
0.2
0.15
0.1
0.05
0
-300
-200
-100
0
100
200
300
X position (mm)
1Hz
10Hz
40Hz
90Hz

Fig. 10

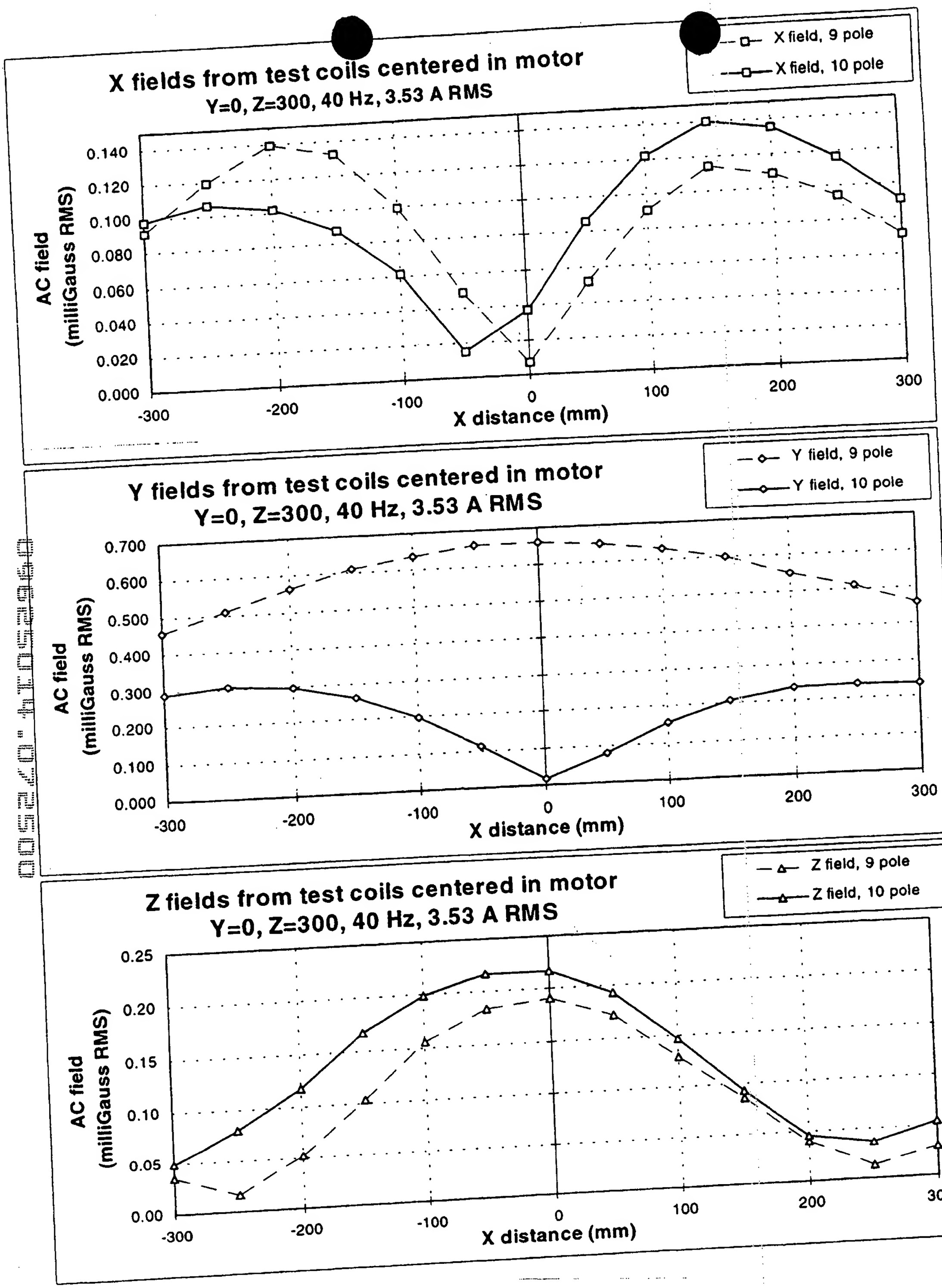
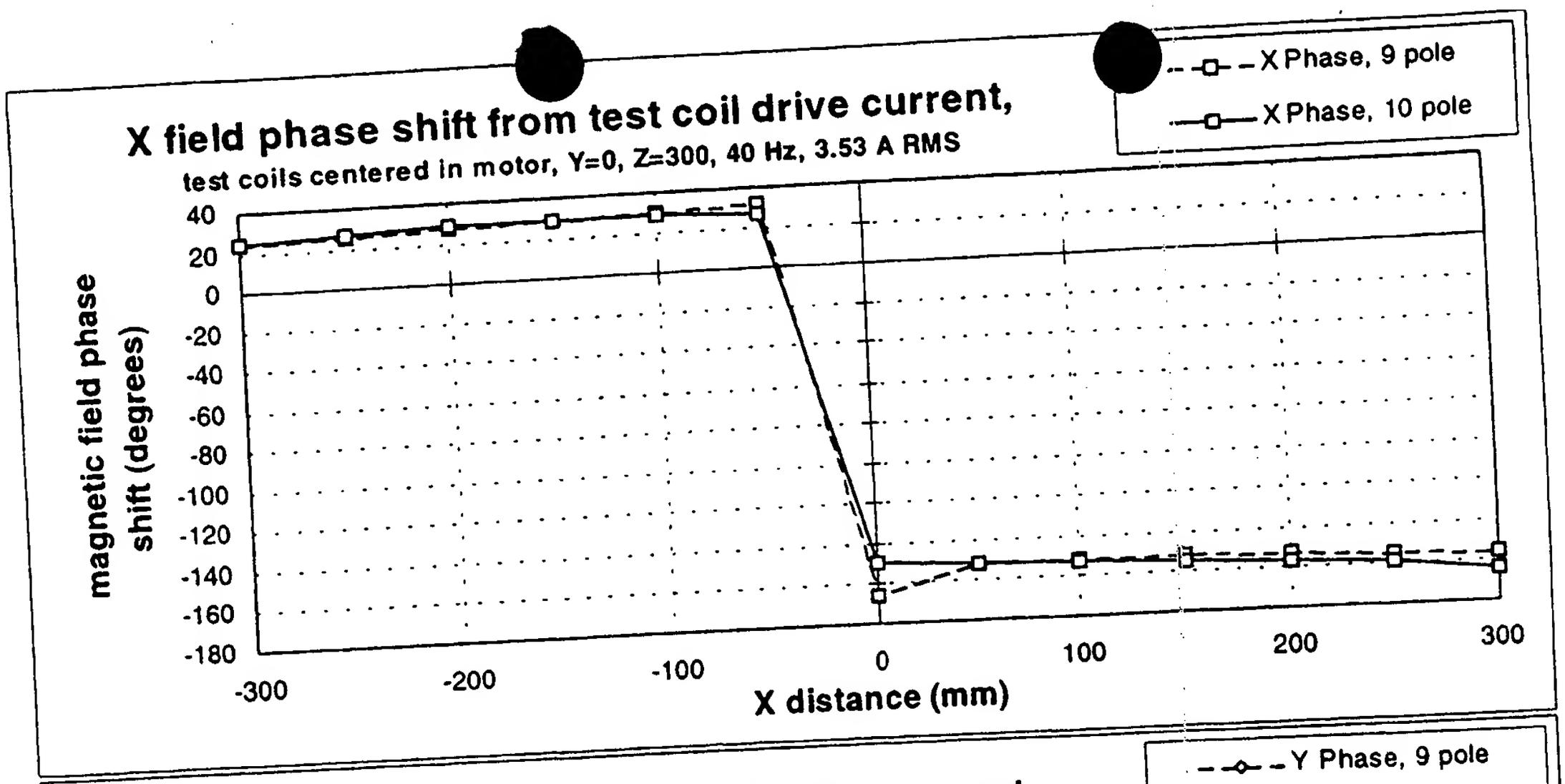
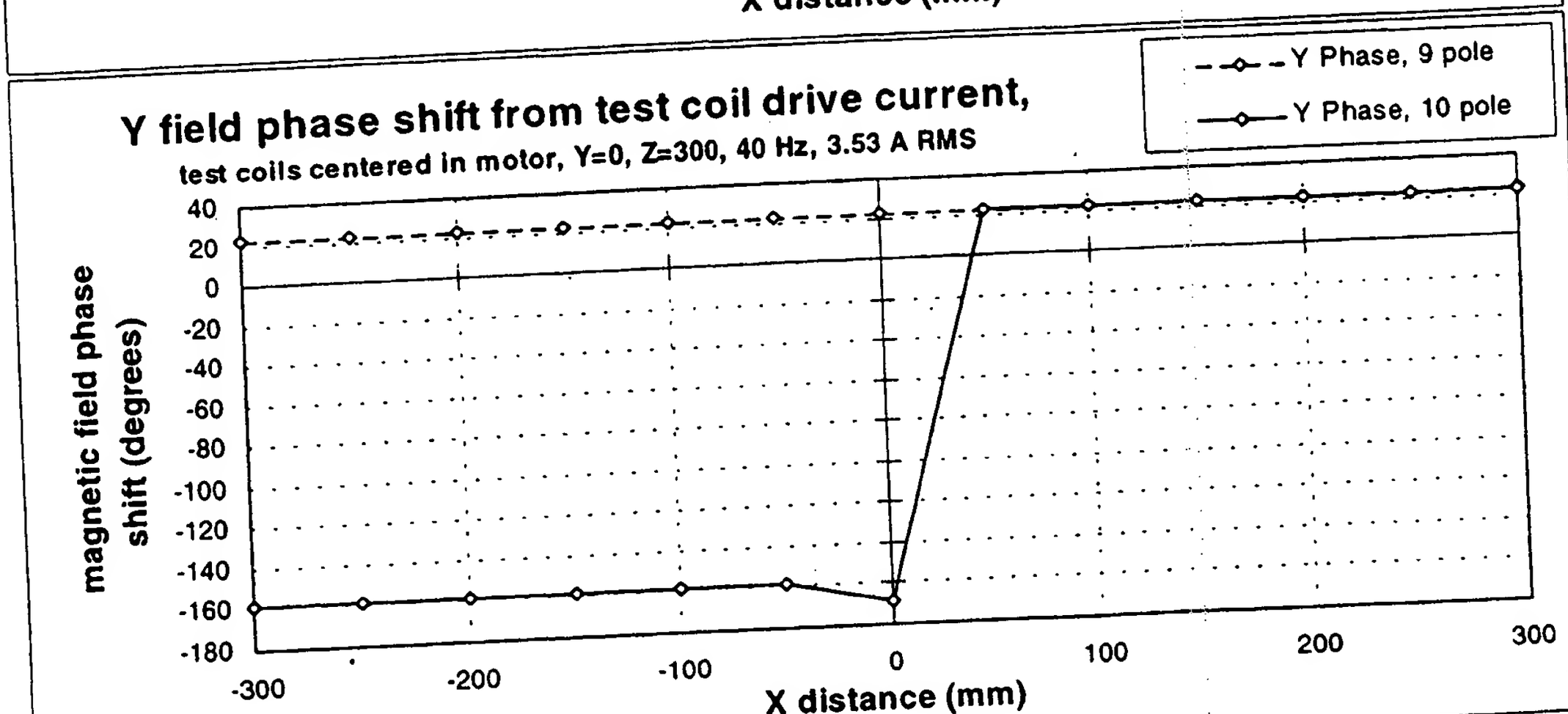

X fields from test coils centered in motor
Y=0, Z=300, 40 Hz, 3.53 A RMS
X field, 9 pole
X field, 10 pole
AC field (milliGauss RMS)
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
-300
-200
-100
0
100
200
300
X distance (mm)
Y fields from test coils centered in motor
Y=0, Z=300, 40 Hz, 3.53 A RMS
Y field, 9 pole
Y field, 10 pole
AC field (milliGauss RMS)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-300
-200
-100
0
100
200
300
X distance (mm)
Z fields from test coils centered in motor
Y=0, Z=300, 40 Hz, 3.53 A RMS
Z field, 9 pole
Z field, 10 pole
AC field (milliGauss RMS)
0.25
0.20
0.15
0.10
0.05
0.00
-300
-200
-100
0
100
200
300
X distance (mm)

Fig. 11


X field phase shift from test coil drive current,
test coils centered in motor, Y=0, Z=300, 40 Hz, 3.53 A RMS
X Phase, 9 pole
X Phase, 10 pole
magnetic field phase shift (degrees)
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-300
-200
-100
0
100
200
300
X distance (mm)


Y field phase shift from test coil drive current,
test coils centered in motor, Y=0, Z=300, 40 Hz, 3.53 A RMS
Y Phase, 9 pole
Y Phase, 10 pole
magnetic field phase shift (degrees)
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-300
-200
-100
0
100
200
300
X distance (mm)

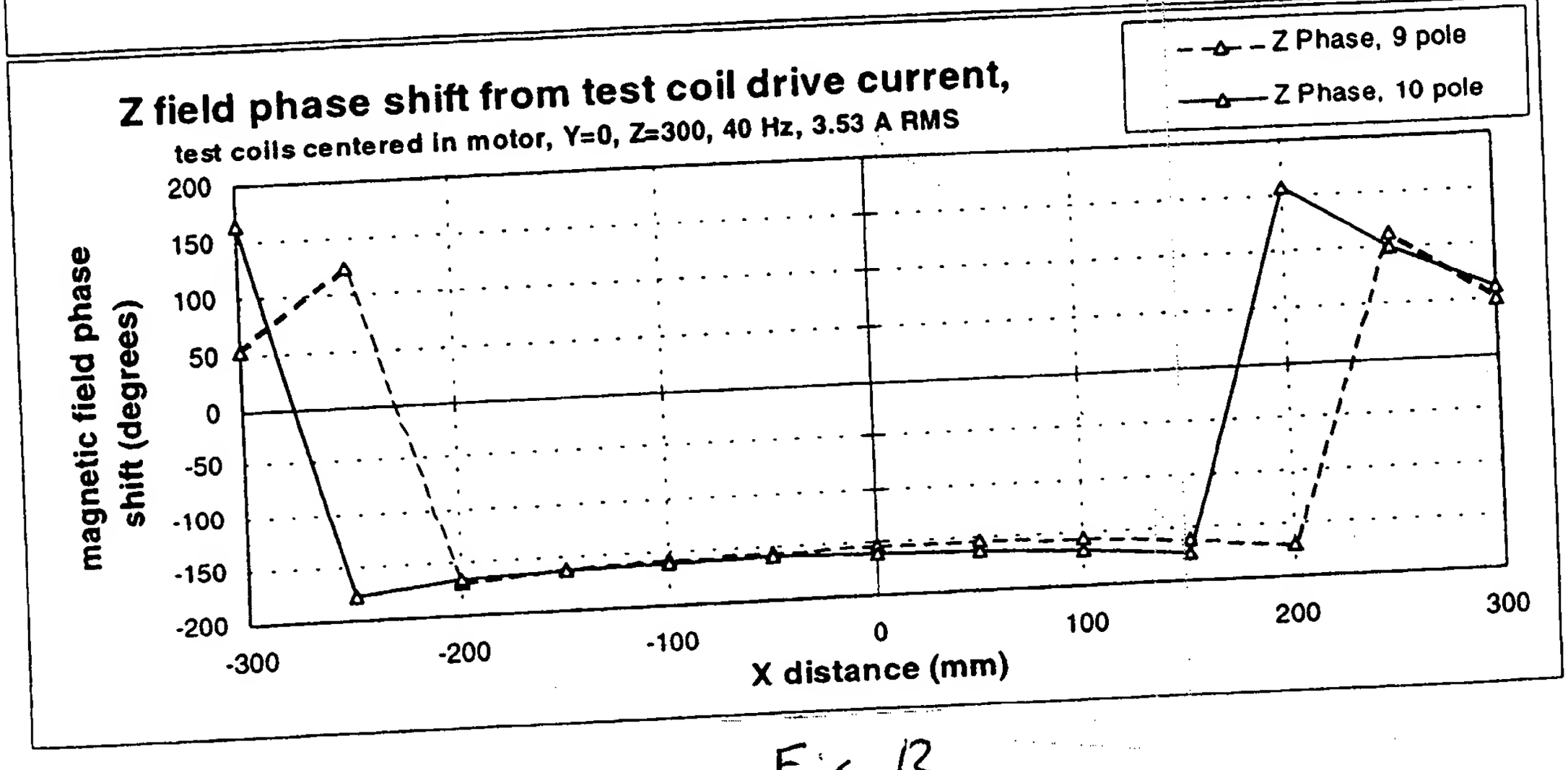

Z field phase shift from test coil drive current,
test coils centered in motor, Y=0, Z=300, 40 Hz, 3.53 A RMS
Z Phase, 9 pole
Z Phase, 10 pole
magnetic field phase shift (degrees)
200
150
100
50
0
-50
-100
-150
-200
-300
-200
-100
0
100
200
300
X distance (mm)

Fig. 12

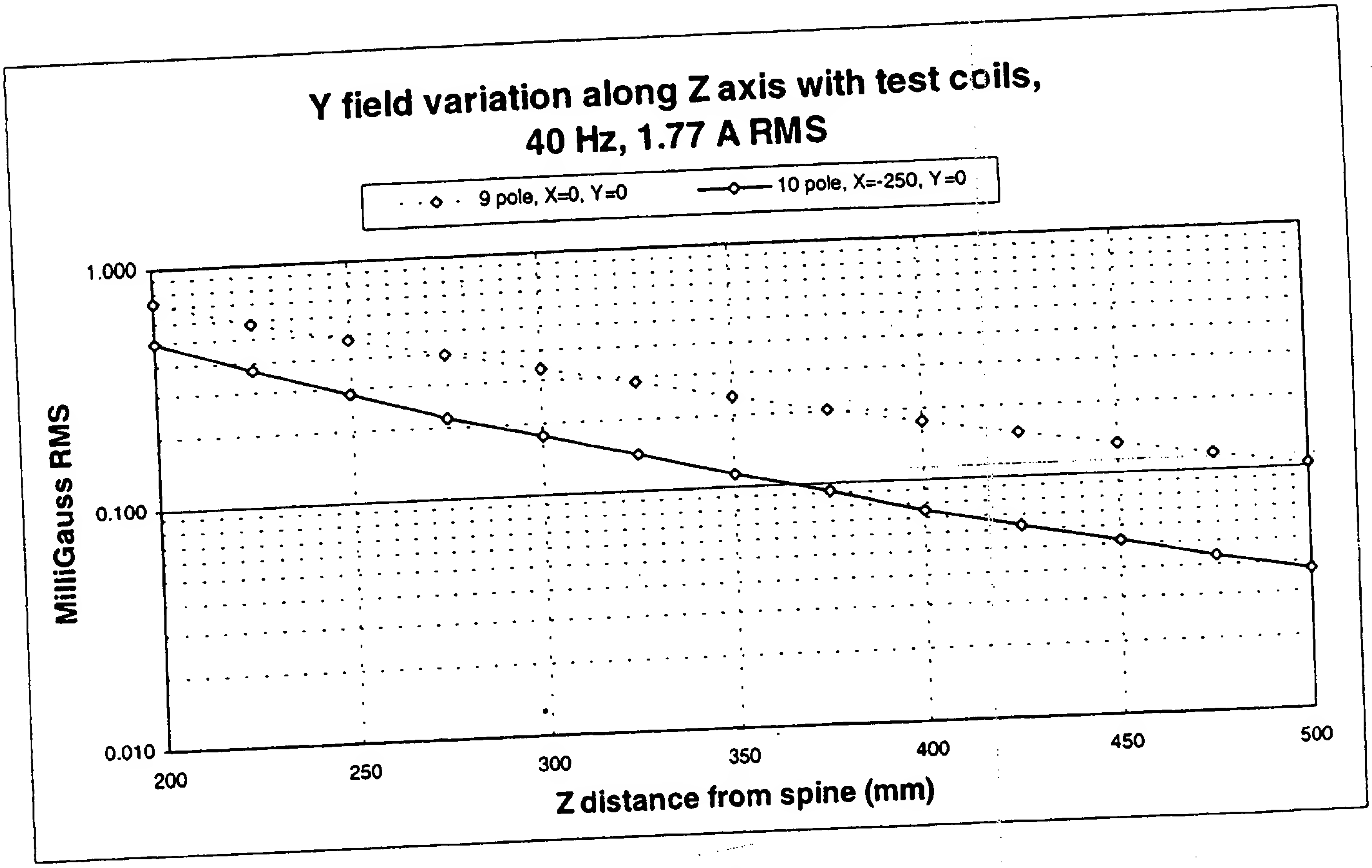


Figure 13

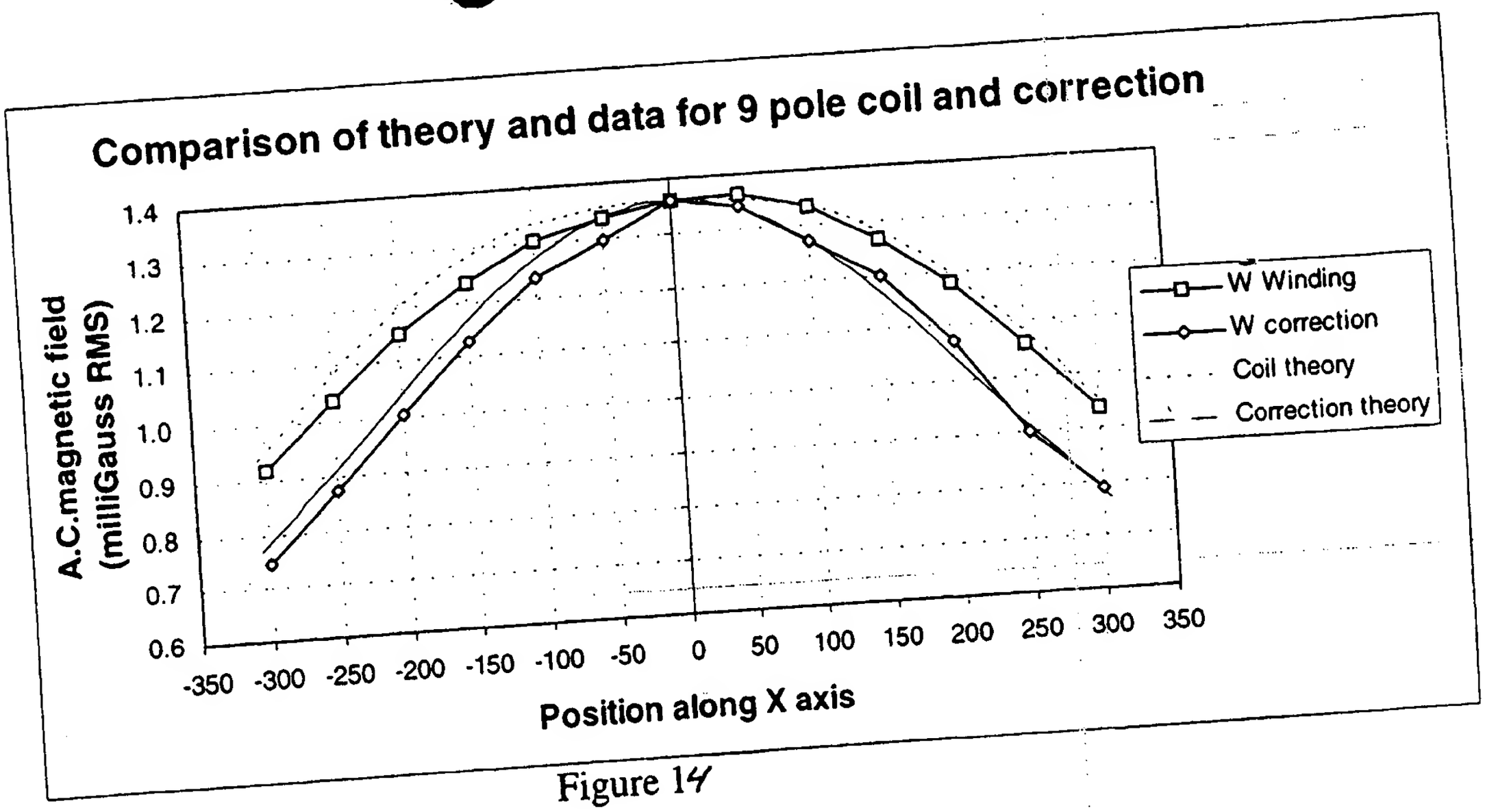


Figure 14

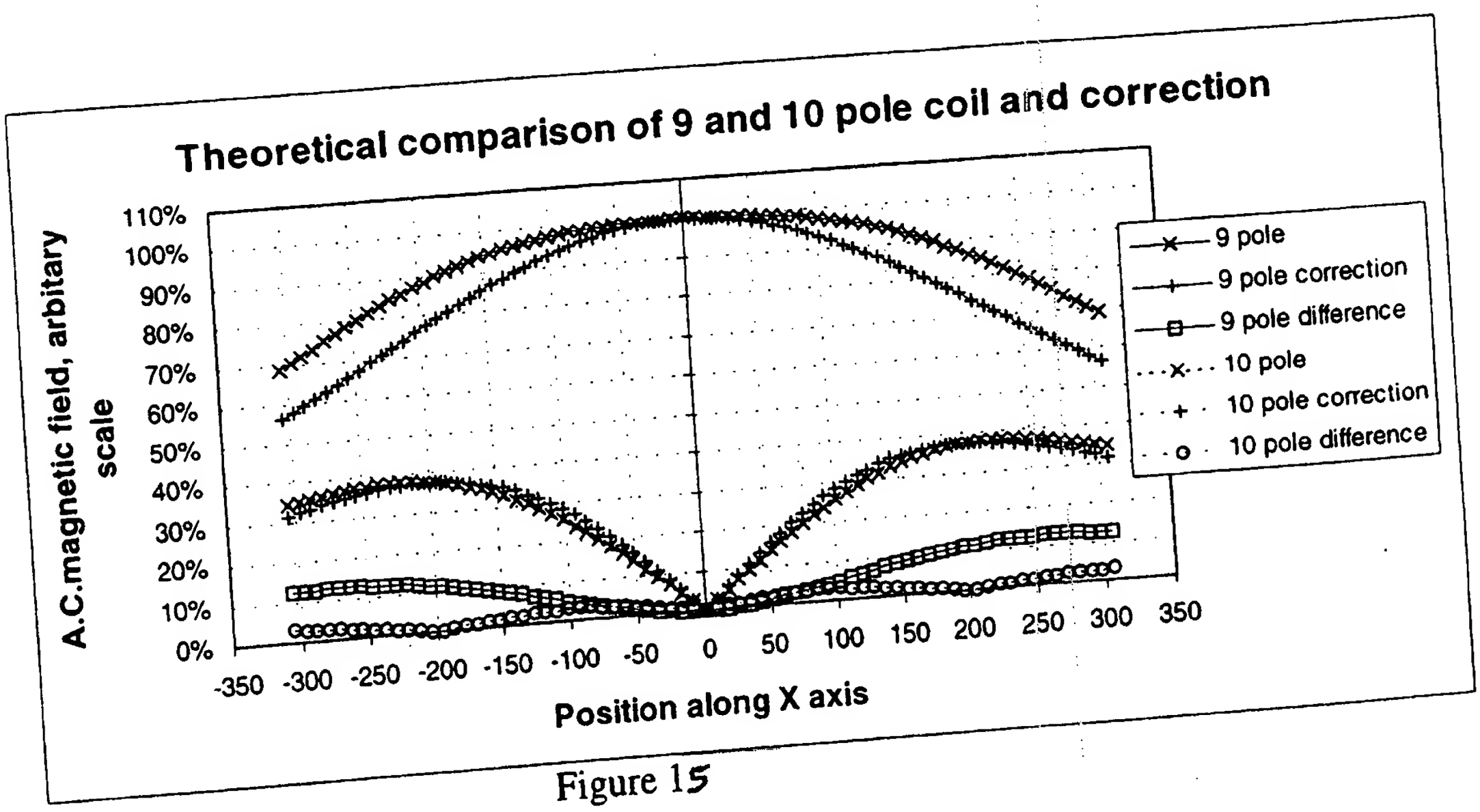
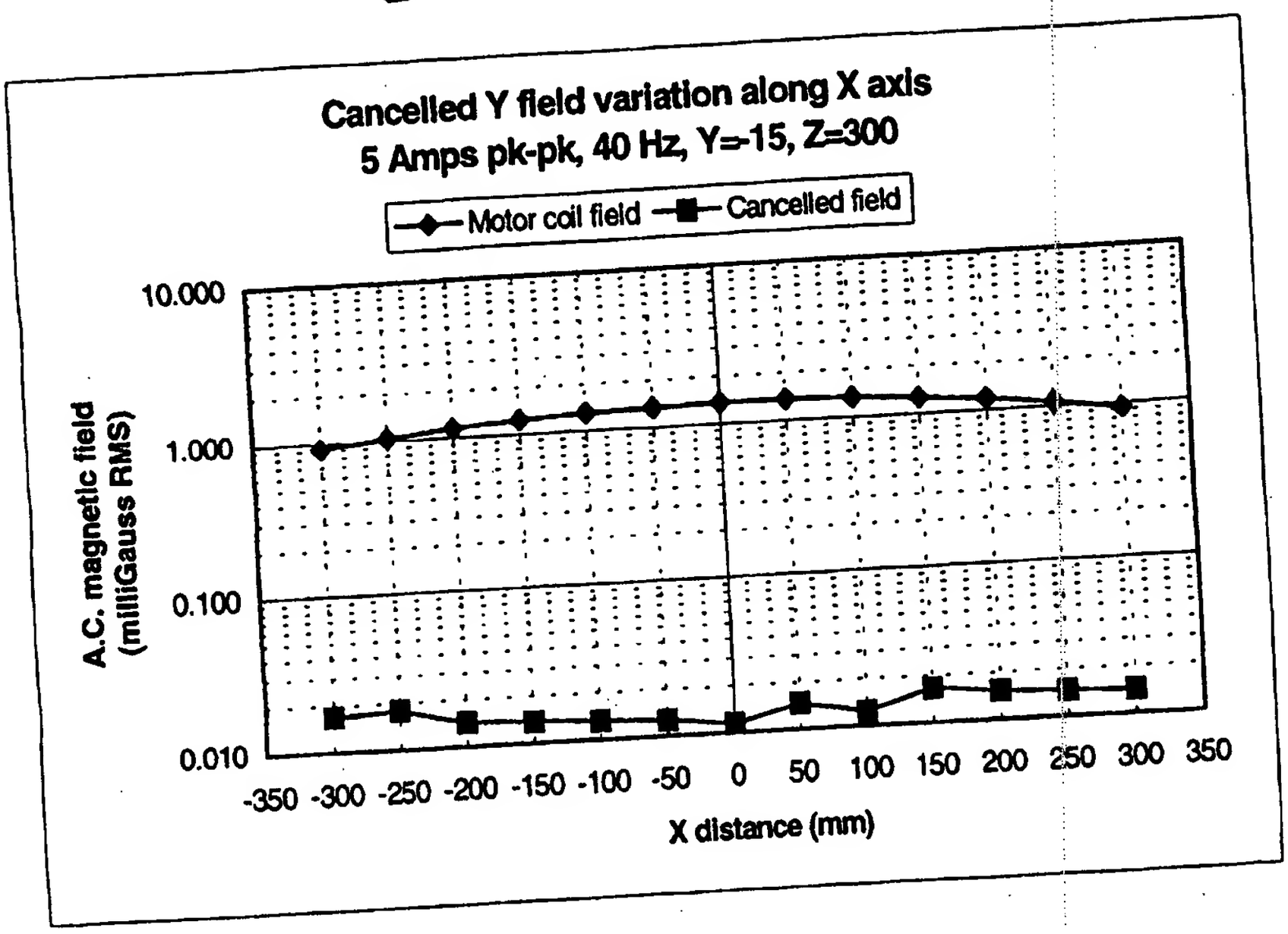


Figure 15


Cancelled Y field variation along X axis
5 Amps pk-pk, 40 Hz, Y=-15, Z=300
Motor coil field
Cancelled field
A.C. magnetic field (milliGauss RMS)
10.000
1.000
0.100
0.010
-350 -300 -250 -200 -150 -100 -50 0 50 100 150 200 250 300 350
X distance (mm)

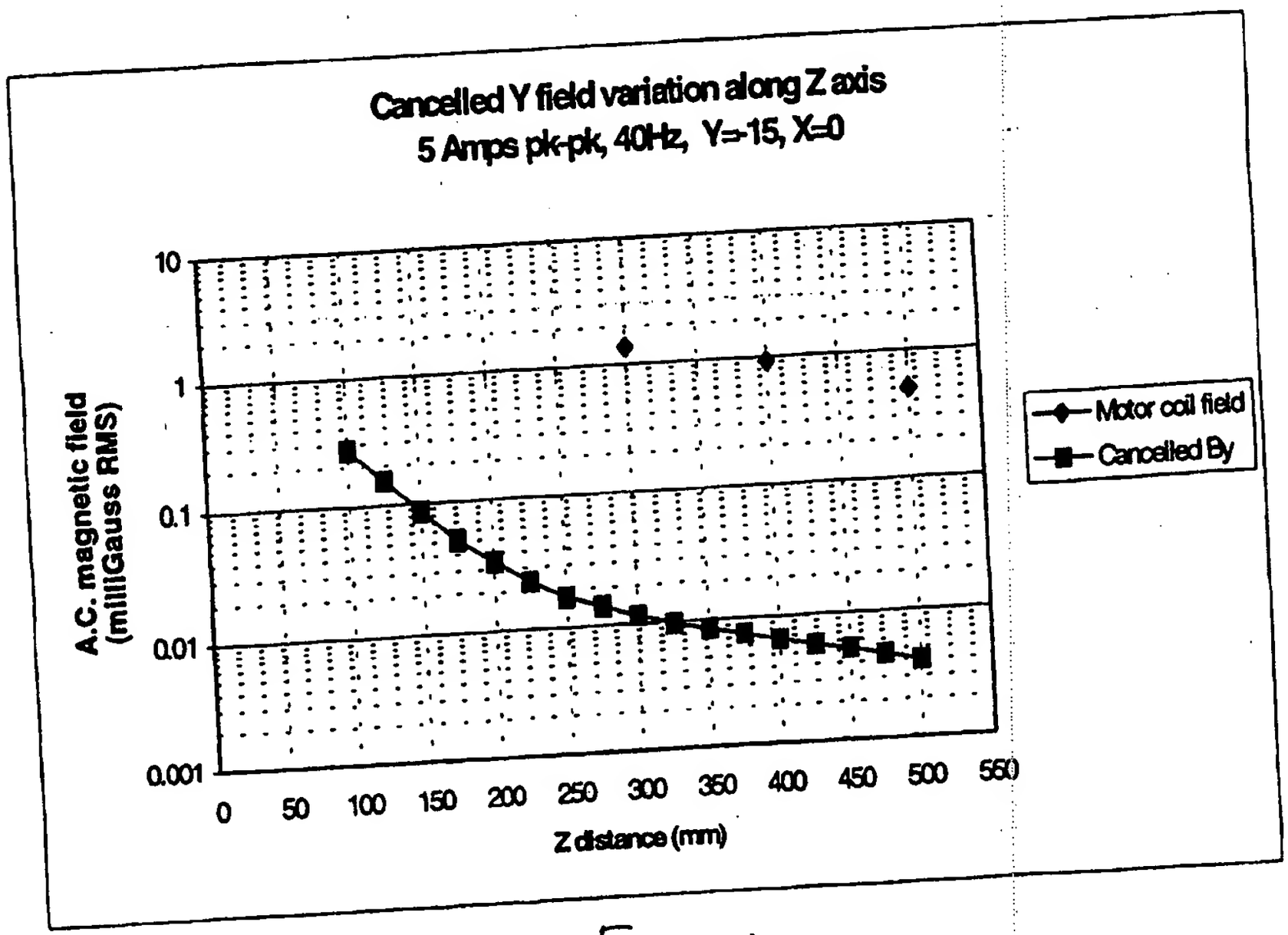

Cancelled Y field variation along Z axis
5 Amps pk-pk, 40Hz, Y=-15, X=0
A.C. magnetic field (milliGauss RMS)
10
1
0.1
0.01
0.001
0 50 100 150 200 250 300 350 400 450 500 550
Z distance (mm)
Motor coil field
Cancelled By

Figure 16

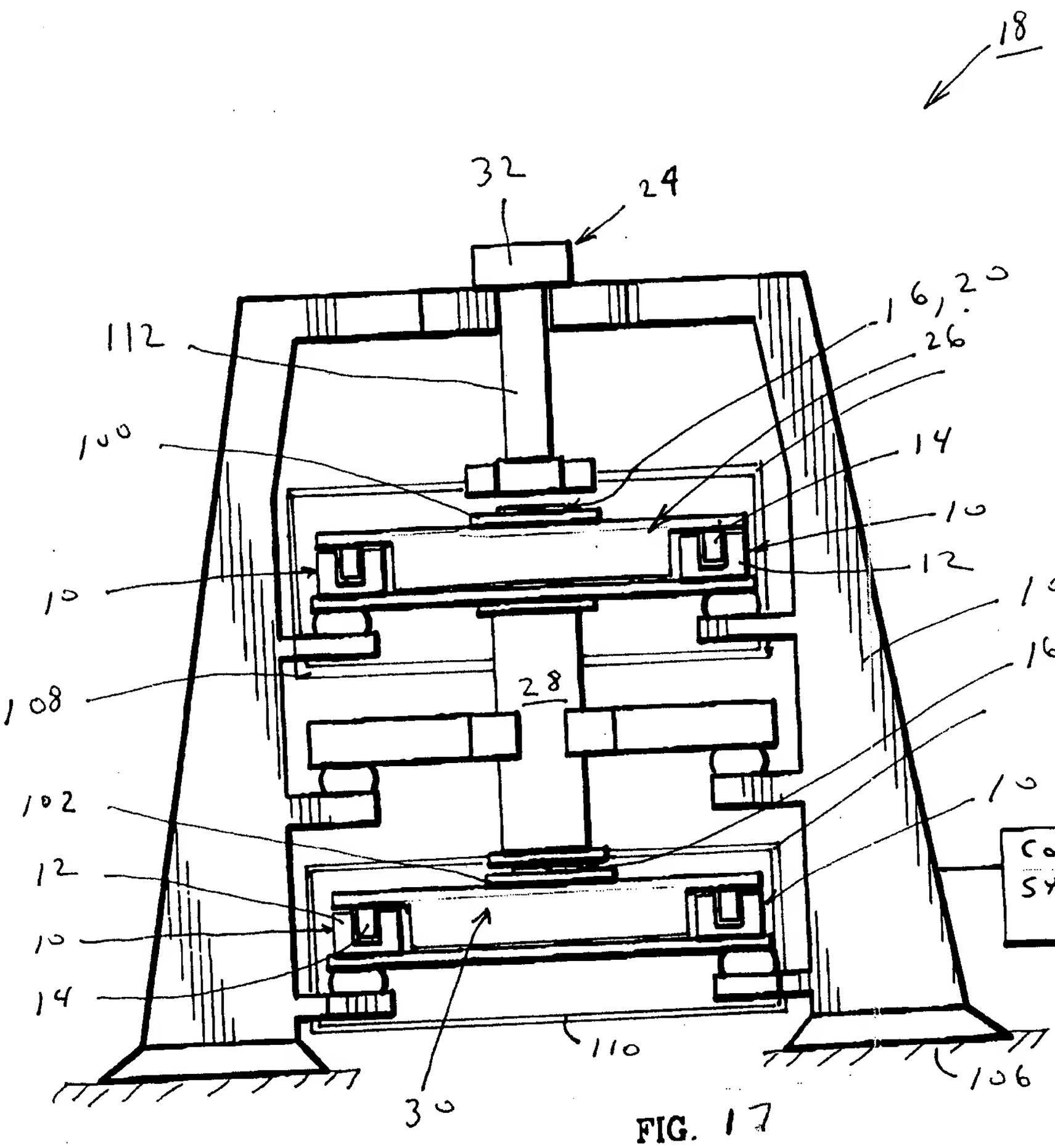


FIG. 17